Cloud based Agile Methodology Test Automation for Web Application by Using Tanh Activated Clustering and Classification Model (TACC) in Machine Learning

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Abstract

Automatic functional tests are a long-standing issue in software development projects, and they are still carried out manually. The Selenium testing framework has gained popularity as an active community and standard environment for automated assessment of web applications. As a result, the trend setting of web services is evolving on a daily basis, and there is a need to improve automatic testing. The study involves to make the system to understand the experiences of previous test cases and apply new cases to predict the status of test case using Tanh activated Clustering and Classification model (TACC). The primary goal is to improve the model's clustering and classification output. The outcomes show that the TACC model has increased performance and demonstrated that automated testing results can be predicted, which is cost effective and reduces manual effort to a greater extent.

Keywords


Introduction

With the emergence of the tech boom and a massive increase in web development implementations along with their associated use, it has become an absolutely vital for assessing the reliability of web services. Considering the significance of economic relevancy in today's society, web application testing is gaining traction. The cost of replacing the software glitch is equal to the time it takes to deliver. Errors in software
(bugs) can have a negative impact on real-time activity and even prove fatal. It is critical to address such inconsistencies beginning of the software development process, as they become more expensive as the software matures (Umar, M.A., & Zhanfang, C, 2019). For example, Jones discovered in his survey that $500 billion is lost each year due to poor software quality (Capers, J., 2012). Furthermore, the NIST (NIST, 2002) reports that system failures cost the US economy an estimated $59.5 billion per year, and that 33 percent of the cost could be reduced through improved testing, reduced through improvements in testing, in spite of the fact that it will not eliminate all the bugs. The serious consequences of system bugs cannot be overstated, which is why it is critical to test software before it could be presented. Software testing is viewed as the technique of evaluating a software programme with the goal of identifying errors or flaws. Testing process is also performed to ensure that the software accurately operates effectively then where its access, accomplish, and save the software quality, and, as a result, check that the software is best suited for such use. It is an essential stage in the Software Development Life Cycle (SDLC) process that consumes approximately 50% of the time and effort in software development. In the SDLC, the software is software is deficient until it passes testing. The general motivation for validation is not to exemplify that the framework is error-free, but to provide optimism that the process is working properly mounting. The proper platform ensures that either no or insufficient testing was executed on the technology platform. The longer it takes to discover a software glitch, the more expensive it is to fix it because the technology has been divided up or is in use by clients (Kundu, S., 2012). The conventional and digitalized testing processes aid in the validation of software applications. The testing is done mechanically in manual testing procedures without the use of any software application. It takes more time, the computational efficiency is slower, and the possibilities of an error occurring are higher. Conventional testing phase has distinct stages such as testing phase, acceptance tests, verification and validation, and usability testing.

Best programming principles and their incorporation into the development process are the emphasis of agile methodologies. They are methodologies for defining the disciplined management of software development: agility advocates for the adoption of an iterative and incremental approach to developing software systems that actually match client requirements (Chantit, S., & Essebaa, I., 2021). On the one hand, scrum has numerous advantages, but it also has several disadvantages, particularly in software testing due to the time restriction for each sprint. The tester must pay attention to both time management and software quality issues. In a scrum, software must be thoroughly tested in each sprint to ensure that it meets client requirements. 1. Constantly changing requirements might

**Automated Software Testing**

Test automation increases the precision and saves time by increasing testing phase. The process of performing actions with the stated aim of exploring discrepancies in the script is known as automated software testing. It is the operation of undertaking or evaluating a system or component of a system by automated means in order to ensure that it meets specified requirements or to identify the actual and expected outcomes. (Cervante, 2009) (Ieshin, A., Gerenko, M., Dmitriev, V., 2009). In other utterances, this is creating development tools to assess the code base that has been installed. It intends to create automated testing phases. (Sadiq, M., & Firoze, F., 2014). The software testing is often utilized in relationship with the verification and validation. One of the common issues that software developers face is the automated functional test. While automated unit testing has gained traction, functional testing is still done manually as much as possible in both agile and non-agile projects. Testing process involves the use of testing equipment and reduces the number of manual tasks, reduces the number of administrative processes. The automation testing is more reliable, quicker than the manual testing and quantities of resources needed for the task was decreased. Automation testing is more reliable and faster than manual processes, and the number of resources required for the task has been reduced. Automation testing is more credible, quicker testing, and uses fewer resources per task. It can re-use tests on different variants of an assignment and run more tests in less duration. There are numerous open-source automation systems available. There must be countless factors to consider when selecting measuring techniques. It is the ease of reconciliation, the viability of the application's design and implementation, the effectiveness and upkeep of the tests. All of these are fully supported by the automation testing resource selenium. This is not a standalone system, but it does include a number of software tools such as an IDE, navigation system, web driver, and grid. Selenium is a great software screening tool for web applications.

The testing is the vital significance in the software engineering. The functional GUI testing has recently developed test automation devices like (Berner, S., Weber, R., & Keller, R. K., 2005), Robotium (Chawathe, S. S., Rajaraman, A., Garcia-Molina, H., & Widom, J., 1996) and Selenium (Choudhary, S. R., Zhao, D., Versee, H., & Orso, A., 2011). These devices implement test scripts, which are executable executions of standard requirements situations. The scripts for the tests comprise of commands that simulate the user’s interactions with the GUI and of attestations that look at an observed condition of
the GUI with the expected one. In spite of the fact that test automation permits. An examination of Adobe's Acrobat Reader revealed that 74% of test scripts are cracked among two accelerated updates (Memon, A. M., & Soffa, M. L., 2003). Worryingly, perhaps a set of simple GUI problem can affect 30% - 70% of defects in the system's test script (Grechanik, M., Xie, Q., & Fu, C., 2009). To test the Software Under Test (SUT), the testing professionals must implement and run the programme (Sangave, V., & Nandedkar, V., 2015). The Selenium testing framework has gained popularity as an active community and conventional landscape for automated web application testing. As a result, the trend setting of web applications is changing on a daily basis, and there is a need to improve automatic testing. Much research has been made to improve the automated testing.

**Agile Testing**

In agile, testing team are members of the team who work exclusively with developers and must be accessible at all phases of the development process. Each session includes a test program, so every tiny relaunch is tested by testers before being delivered to the client for testing process (Nawaz et al. 2008). Clients can perform pair testing with the developer or tester during Agile testing. The service user may be asked to help the analyser design test cases or create automated tests. In agile testing, testing team start writing test scenarios first so that designers could do their jobs properly; this pattern is known as "Test Driven Development." In agile testing, phase starts with experiment development and ends with computer-controlled user acceptance on consistent test execution for modifications introduced to the software.

**Background**

**A. Agile Development in Cloud Environment**

The combination of agile and cloud benefits the development of distributed applications, information sharing, work prioritisation, disclosure, and infrastructural developments (Tuli, A., Hasteer, N., Sharma, M., & Bansal, A., 2014) (Zarinah, I.I.S.S.S., & Kasirun, M., 2013) in the sense that cloud computing has an impact on the agile project ecosystem by improving performance (Haig-Smith, T., & Tanner, M., 2016) (Nazir, A., Raana, A., & Khan, M. F., 2013) (Wei-Tek, T., Wenjun, W., & Huhns, M.N., 2014). In agile viewpoint, the ecosystem denotes a structure or collective of interconnected components such as the development platform, team interrelatedness, and the entire network. Another advantage of cloud computing is that it reduces costs while also enabling adaptability and efficiency in the development of agile software. (Concas, G., Mannaro, K., & Cocco, L., 2013)
Furthermore, cloud-based technologies are used to integrate the agile interactive process. The cloud commuting helps in the agile requirement environment (Younas, M., Jawawi, D. N. A., Shah, M. A., Mustafa, A., Awais, M., Ishfaq, M.K., & Wakil, K., 2020) and deployment of software and decreases the development time. According to the author in (Gopularam, B.P., Yogeesh, C.B., & Periasamy, P., 2012) the agile methodology significantly effects the development of software. This procedure has a proactive impact on software development because it can be initiated and integrated into the resources delivered to associates.

**B. Machine Learning**

There are various types of ML techniques. There are mainly two classification systems for distinguishing algorithms: supervised ML and unsupervised ML. Both are based on the concept of learning algorithm, which refers to data instances provided to derive information. In general, supervised machine learning is divided into two stages. The first stage involves the analysis of the training data set, which comprises of number of samples, each of which has a different set of data points and a single label. The outcome of the research is a model that attempts to generalise how the features recognise with the label. The model has been applied towards another validation set of data with unidentified labels in the second phase. In a classification algorithm, the framework attempts to estimate the label of each independent test; in a ranking algorithm, the result of this step is an ordering as such, whenever the labels become identified, the highest valued labels are predicted is at or consistently at the top of the hierarchy, with the minimum valued labels at or close to the bottom. Conversely, the unsupervised techniques are unlabelled data. Clustering is an unmonitored methodology in which cases are categorised into clusters based on their characteristics. (Tsai, W. T., Wu, W., & Huhns, M. N., 2014).

Despite the fact that much work has been done to apply ML techniques to programming skills, particularly operating system testing, there appears to be very little scientific publication in the opposite direction: applying software testing techniques to ML software. Far more study has been undertaken on the development of simulation tools for testing process (Karlik, B., & Olgac, A. V., 2011) and the production of validation data (Neal, R. M., 1992) and that has not been implemented to ML code. Archives of "reusing" large datasets have been compiled (for example, the UCI Machine Learning Repository) for the purpose of evaluating outcome reliability, but not for test results in the software context.
Much research has been made to improve the automated testing. Whereas, in automated testing only the test cases that are shown to the system will be tested. When the system is fed with new details or data, it will collapse. The primary goal of this research is to develop a system that can understand previous test case experiences and apply new cases to predict the status of test cases using Tanh activated Clustering and Classification model (TACC). The objective of the study is to improve the performance of clustering and classification of the model.

**Methodology**

The framework for the proposed test automation for web application by using agile methodology (scrum) in cloud environment as shown in fig: 1. The core framework engine comprises of the seven main processing steps.

1. **Automation Testing**

The use of various forms of software automation testing tools to analyse the website performance is known as web application automated testing or automated website testing. In addition, trying to implement effectual automated testing innovations (Machine Learning) for custom application testing enables testing process and comparing actual
findings to predicted or anticipated outcome. While planning to visit specific sites, users may experience several error cautions or troubles, impeding the legibility and applicability of a web page, as well as users will prevent unnecessary using such web applications.

2. Live Test Inference Dataset

Data sources are typically a system that collects actual information first from process to generate it. The central server of the ML model receives data from the data sources and feeds it into the model. The host system provides the infrastructure required to convert the commands in the ML model together into completely operational application. After the ML model's output has been generated, the dedicated server system sends it to the data destinations. A web-based system that acknowledges input information via a REST interface, or a dataflow application that accepts data input. Examples of host systems include incoming data feeds.

3. Preprocessing

Multiple servers are occasionally used to relieve the strain on a single server. The process of combining document information from multiple Mobile application servers is known as data fusion. When a person logs in from several Web or application servers, data fusion is used to combine the data and solve numerous user identification sessions, among other things. External citations to numerous devices which may or may not be relevant to the analysis's goal, such as citations to style files, graphics, or sound files, are typically removed during data cleaning. When some information does not provide good data in analysis or data mining jobs, data cleansing is performed. Erroneous references should be removed.

4. Classify the Clustered Data

Identifying the most valuable information and use technology to protect it, such as data classification and labelling automation tools.

5. Performance Analysis

The performance like accuracy, sensitivity, Root mean square, precision was calculated.
6. Agile Methodology (Scrum)

The scrum technique, which is an agile software development process, was used to automate the web application (university website) by in cloud environment application. The agile approach is an alternative to the traditional waterfall paradigm that allows teams to respond to unpredictability in product development by using incremental, iterative work cadences called sprints. Scrum is a well-known and straightforward framework for implementing agile technique. It decreases the amount of work required to create the software product. A product can be implemented under scrum methodology in a series of fixed-length iterations called sprint lengths, where the software of the product can be made shippable to clients in the relevant sprint lengths. In addition, the solution with working software can be supplied to consumers progressively and empirically, with new functions added as needed. Scrum approach requires a system that is well automated enough to keep product deliverables within sprint length.

7. Tanh Activation Function

The Tanh function is also referred to as the Hyperbolic Tangent Feature. Tanh is a feature better than the logistic regression. The tanh function is the smoother (Le Cun et al. 2015), zero- The outcome of the tanh function is given by the eqn because it is a centred function with values ranging from -1 to 1. (1).

\[
f(x) = \frac{e^x - e^{-x}}{e^x + e^{-x}}
\]  

(1)

The tanh function has become the preferred function for multi-layer neural network training due to its superior training performance (Karlik, et al. 2011; Neal, R. M. 1992). However, the tanh function was unable to resolve the overfitting problem that the other functions had as well. The primary advantage of using this purpose is that it generates zero-centred output, which aids in the back-propagation process. The tanh function has the property of only achieving a gradient of one when the value of the input is zero, i.e. when x is zero. As a result, the tanh function generates some dead neurons during computation. The dead neuron is a situation in which the stimulation weight, which is very seldom used as a result of a zero gradient, is used.

\[
sigmoid (x) = \frac{1}{e^{-x} + 1}
\]  

(2)

\[
sigmoid _k (x) = k \cdot sigmoid (k \cdot x) - k / 2
\]  

(3)

\[
tanh (x) = - (1 - 2 \cdot sigmoid (2 \cdot x))
\]  

(4)

\[
Fast \ Tanh \ (x) = - (1 - 2 \cdot \ Fast \ Sigmoid (2 \cdot x))
\]  

(5)
We can extend what we've done so far to positive values thanks to the antisymmetry of the tanh function. The following is an example of pseudo-code:

\[
\text{Fast Tanh} \ (x) \rightarrow y \\
x_n = x > 0? \quad -x: x \\
a = x > 0 \\
y_n = \neg(\text{compl1(twice(FastSigmoid(twice(x_n))))}) \\
y = s > 0? \quad -y_n: y_n
\]

**Results and Discussions**

Test method in software design is a method of optimising test automation that is adaptable in agile methodologies. Agile automation testing aims to enhance the capacity of the software project while ensuring accuracy, speed of delivery, and consumption. The project was tested utilising the agile methodology during the implementation of the Web application. In scrum, automation testing was implemented. During the implementation of the project in an agile setting, the selenium web driver was used to automate the test execution.

The use of testing tools for automation testing enables test execution and comparing actual findings to projected or anticipated outcome. While visiting individual sites, users may encounter numerous error warning signs or troubles, impeding the legibility and applicability of the webpage, and consumers will prevent unnecessary using such web applications. The fig 2 and 3 are the web application (university website) to run.

![Fig. 2 Created and Edited the Web Components](http://www.webology.org)
A web application is application software that works on a web server, as opposed to computer-based software applications that run domestically. To access web apps, the consumer uses web-based webpage with an active data connection. It shows that the university application that created and edited the components and run-on server application. The fig 4 shows the login page with username and password. Automating testing Tanh Activated clustering and classification model were used. The model takes the real value as input. The fig 5 shows the automation testing for web application. Automated Website Testing is the process of testing a website's functioning by automating end-user scenarios. QAs utilise an automation tool like Selenium to write end-user scenarios that simulate user interactions on a website's UI.
1. Performance of Existing Algorithm

The proposed Tanh clustering classification technique compared with other classifiers such as Random forest, Decision tree and Naive Bayes in terms of performance. The result parameters for the performance analysis are as follows.

A random forest is a set of decision trees, while a decision tree is a collection of decisions. As a result, it is a time-consuming but lengthy process. A decision tree, on the other arm,
is fast and easy to apply to large amounts of data, particularly support to a linear set. The random forest model necessitates a significant amount of training. Both problems can be solved using Decision Trees. One of the most important facets of Decision Trees is that they would only necessitate a data table and will design and build a classification algorithm straightforwardly from that data, with no prior design effort required. Simple decision trees are more likely than other strategies to over fit the training data, which means you’ll need to prune the trees and fine-tune the pruning procedures. The figure 7, 8, 9 shows the automation testing for web application (university website) of existing algorithm such as Random Forest, Naive Bayes, Decision tree.

2. Random Forest

The random forest is an ensemble learning method in which all function Object () { (native code) } classifiers are of the same kind (i.e., decision tree). As a result, the random forest is a method of homogenous ensemble learning.

The performance of random forest like precision, recall, ROC, TP Rate, FP Rate, F-measures is calculated.

<table>
<thead>
<tr>
<th>TP Rate</th>
<th>FP Rate</th>
<th>Precision</th>
<th>Recall</th>
<th>F-Measure</th>
<th>ROC Area</th>
<th>class</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.467</td>
<td>0.593</td>
<td>0.44</td>
<td>0.467</td>
<td>0.399</td>
<td>0.453</td>
<td>Valid</td>
</tr>
<tr>
<td>0.407</td>
<td>0.533</td>
<td>0.433</td>
<td>0.407</td>
<td>0.419</td>
<td>0.399</td>
<td>Invalid</td>
</tr>
<tr>
<td>Weighted Avg.</td>
<td>0.437</td>
<td>0.563</td>
<td>0.436</td>
<td>0.437</td>
<td>0.436</td>
<td>0.399</td>
</tr>
</tbody>
</table>
Table 2 Confusion Matrix

<table>
<thead>
<tr>
<th></th>
<th>a</th>
<th>b</th>
<th>Classified as</th>
</tr>
</thead>
<tbody>
<tr>
<td>70</td>
<td>80</td>
<td>a=valid</td>
<td></td>
</tr>
<tr>
<td>89</td>
<td>61</td>
<td>b=invalid</td>
<td></td>
</tr>
</tbody>
</table>

The table 2 shows the confusion matrix of the random forest. Here it classified as whether it is valid or not. The Correctly Classified Instances calculated by Random Forest are 43.6667 percent. Incorrectly Classified Instances account for 56.3333 percent of all instances. -0.1267 is the determined Kappa statistic. The mean absolute error is 0.504, the root mean squared error is 0.5044, the relative absolute error is 100.8203 percent, the root relative squared error is 100.8893 percent, and the total number of instances is 300. 1023 milli-second is used.

3. Decision Tree

![Decision Tree](image)

Fig. 8 Automation Testing of Existing Algorithm Decision Tree

Table 3 Detailed Accuracy by Class

<table>
<thead>
<tr>
<th>TP Rate</th>
<th>FP Rate</th>
<th>Precision</th>
<th>Recall</th>
<th>F-Measure</th>
<th>ROC Area</th>
<th>class</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>0.5</td>
<td>1</td>
<td>0.667</td>
<td>0.5</td>
<td>Valid</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0.5</td>
<td>Invalid</td>
</tr>
<tr>
<td>Weighted Avg.</td>
<td>0.5</td>
<td>0.5</td>
<td>0.25</td>
<td>0.5</td>
<td>0.33</td>
<td>0.5</td>
</tr>
</tbody>
</table>

Table 4 Confusion Matrix

<table>
<thead>
<tr>
<th></th>
<th>a</th>
<th>b</th>
<th>Classified as</th>
</tr>
</thead>
<tbody>
<tr>
<td>150</td>
<td>0</td>
<td>a=valid</td>
<td></td>
</tr>
<tr>
<td>150</td>
<td>0</td>
<td>b=invalid</td>
<td></td>
</tr>
</tbody>
</table>
The table 4 shows the confusion matrix of the decision tree. Here it classified as whether it is valid or not. The number of correctly classified instances is 150. The amount of incorrectly classified instances is 150. The Kappa statistic is zero. The average absolute error is 0.5. The root mean squared error is equal to 0.5. The relative absolute error is one hundred percent. The root relative squared error is 100%. The total number of instances is 300, and the time spent is 131 milliseconds.

4. Naive Bayes

![Naive Bayes Image]

**Fig. 9 Automation testing of existing algorithm Naive Bayes**

<table>
<thead>
<tr>
<th>Table 5 Detailed Accuracy by Class</th>
</tr>
</thead>
<tbody>
<tr>
<td>TP Rate</td>
</tr>
<tr>
<td>0.33</td>
</tr>
<tr>
<td>0.52</td>
</tr>
<tr>
<td>Weighted Avg.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Table 6 Confusion Matrix</th>
</tr>
</thead>
<tbody>
<tr>
<td>a</td>
</tr>
<tr>
<td>50</td>
</tr>
<tr>
<td>72</td>
</tr>
</tbody>
</table>

The count of true positives is 128, the number of incorrectly classified instances is 172, and the Kappa statistic is -0.1467. The mean absolute error is 0.5054, and the root mean squared error is 0.5058. The relative absolute error is 101.0739 %. The root relative squared error is 101.1554%. The total number of instances is 300.97 ms of time is used.
5. Proposed Algorithm Performance

The proposed Tanh activated clustering and classification technique is compared with other classifiers such as Random forest, Naive bayes and Decision tree in terms of performance. The result parameters for the performance analysis are as follows.

![View Testing Report](image1)

**Fig. 10 Viewing Test Report**

![Automating Testing Tanh Activated Clustering and Classification Model](image2)

**Fig. 11 Automated Testing for the Proposed Tanh Activated Clustering and Classification Model**
**Tanh Activated Cluster Classification**

--- Detailed Accuracy By Class ---

<table>
<thead>
<tr>
<th>TP Rate</th>
<th>FP Rate</th>
<th>Precision</th>
<th>Recall</th>
<th>F-Measure</th>
<th>ROC Area</th>
<th>Class</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>Cluster 0</td>
</tr>
<tr>
<td>1</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>Cluster 1</td>
</tr>
</tbody>
</table>

Weighted Avg. 1 0 1 1 1 1 Cluster 1

--- Confusion Matrix ---

<table>
<thead>
<tr>
<th>a</th>
<th>b</th>
<th>Classified as</th>
</tr>
</thead>
<tbody>
<tr>
<td>70</td>
<td>80</td>
<td>a=valid</td>
</tr>
<tr>
<td>89</td>
<td>61</td>
<td>b=invalid</td>
</tr>
</tbody>
</table>

Correctly Classified Instances is 300; Incorrectly Classified Instances is 0, the Kappa statistic is to be 1. The mean absolute error, root mean squared error, and root relative squared error are all zero. The total number of instances is 300.999 milliseconds.

**Fig. 12 Detailed Accuracy by Class of Tanh Activated Cluster Classification**
The fig 13 shows the Tanh Activated cluster classification visualize-simple k means test case report. The graph is plotted between cluster and class colour. Here the test case report is clustered.

Fig. 13 Test Case Report Clustered

Fig. 14 Tanh Activated Cluster Classification ROC Visualize Threshold Curve
The Fig 14 shows the tanh activated cluster classification region of convergence (ROC) visualize the threshold curve. Here, it is plotted area under ROC=1.

6. Validation Results

Table 9 shows the accuracy, precision, recall, F-measure, RMSE is achieved better in proposed Tanh activated clustering classification compared to the existing techniques such as random forest, Decision tree, and Naive bayes.

- **Accuracy**

The accuracy is measured as the ratio of correctly predicted observations to the total observations. Accuracy is defined using eqn (2).

$$\text{Accuracy} = \frac{(t_p + f_n)}{(t_p + f_p + f_n)} \quad (6)$$

- **Precision**

Precision measures the proportion of predicted positives that are correctly identified. Precision is calculated using eqn (3),

$$\text{Precision} = \frac{t_p}{(t_p + f_p)} \quad (7)$$

- **Root Mean Square Error**

The root mean square error (RMSE) is a method for calculating the error or accuracy of a model's prediction. The RMSE is a method for calculating error based on standard deviations. Individual calculations are outputted as residuals, and the final output is supplied as a standard deviation of the amount of the error.

$$\text{RMSE} = \sqrt{\frac{\sum_{i=1}^{n} (Y_i - \hat{Y}_i)^2}{n}} \quad (8)$$

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Random Forest</th>
<th>Decision Tree</th>
<th>Naïve Bayes</th>
<th>Proposed SACC</th>
<th>Proposed TACC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accuracy</td>
<td>43.6667%</td>
<td>50%</td>
<td>42.6667%</td>
<td>99%</td>
<td>100%</td>
</tr>
<tr>
<td>Precision</td>
<td>0.436</td>
<td>0.25</td>
<td>0.424</td>
<td>0.99</td>
<td>1</td>
</tr>
<tr>
<td>Recall</td>
<td>0.437</td>
<td>0.5</td>
<td>0.427</td>
<td>0.99</td>
<td>1</td>
</tr>
<tr>
<td>F-Measure</td>
<td>0.436</td>
<td>0.333</td>
<td>0.422</td>
<td>0.99</td>
<td>1</td>
</tr>
<tr>
<td>RMSE</td>
<td>0.5044</td>
<td>0.5</td>
<td>0.5058</td>
<td>0.0667</td>
<td>0</td>
</tr>
</tbody>
</table>

Thus from our following results obtained, the use of Tanh Activated clustering classifier can consider as a better option as it is simple to use and implement.
Conclusions

An experimental effort was detailed in this paper, in which automation testing was implemented on a Web application using an agile framework. Using Tanh activated Clustering and Classification model (TACC), the study created a system to comprehend the experiences of past test cases and apply new instances to anticipate the state of test cases. The study increased the model's grouping and classification performance. The TACC model has increased performance and demonstrated that automated testing results can be predicted, which is cost effective and reduces manual effort to a greater extent.

References


